Guide to Documents for the Board of Environmental Review for Reviewing the Basis of the Base Numeric Nutrient Standards

Links to cited documents are found in the Reference Section at the end of this guide. In some cases cited documents may have been provided to you directly.

I. Overall Approach to Deriving the Numeric Nutrient Criteria

1. Executive Summary, Suplee and Watson (2013).

2. See Figure 1-2 in Suplee and Watson (2013).

2. See Section 2.6 in Suplee and Watson (2013).

II. Basis of Site-specific Numeric Nutrient Standards

1. Section 4.0, Suplee and Watson (2013); provides two methods for deriving reach-specific numeric nutrient criteria. One method accounts for the downstream effects of a large reservoir, the other is based on the downstream effects from a small-scale ecoregion which has naturally-elevated phosphorus concentrations.

2. Addendum A to Suplee and Watson (2013), by Suplee and Schmidt (2013); reach-specific criteria are developed for a set of streams in the upper Clark Fork River basin influenced by volcanic geology.

III. Numeric Nutrient Standards for Large Rivers

1. Executive Summary, Flynn and Suplee (2013); overview of how criteria were derived for the lower Yellowstone River (only large river with nutrient standards at this time).
2. Full Yellowstone Report—

IV. Numeric Nutrient Standards for Flathead Lake

1. Needs to be developed

V. Development of an Appropriate Low-flow Design Flow (14Q5) for Permitting Numeric Nutrient Standards (Applicable to Wadeable Streams and Large Rivers)

1. Section 12.1 to section 12.4, Flynn and Suplee (2013).

2. McCarthy (2005); provides seasonal 14Q5 values for Montana streams and rivers.??

VI. Implementation Guidance

1. Individual Variance Process

2. Approaches for Deriving Site Specific Criteria

VII. References

Flynn, K., and M.W. Suplee, 2010. Defining Large Rivers in Montana using a Wadeability Index. Helena, MT: Montana Department of Environmental Quality, 14 p. http://deq.mt.gov/wqinfo/Standards/default.mcpx (at bottom of the webpage)

Flynn, Kyle and Michael W. Suplee. 2013. Using a Computer Water Quality Model to Derive Numeric Nutrient Criteria: Lower Yellowstone River. WQPBDMSTECH-22. Helena, MT: Montana Dept. of Environmental Quality. http://deq.mt.gov/wqinfo/standards/NumericNutrientCriteria.mcpx

McCarthy, P.M., 2005. Statistical Summaries of Streamflow in Montana and Adjacent Areas, Water years 1900 through 2002. U.S. Geological Survey Scientific Investigations Report 2004-5266, 317 p. http://pubs.usgs.gov/sir/2004/5266/

Omernik, J.M., 1987. Ecoregions of the Conterminous United States. Annals of the Association of American Geographers 77: 118-125. http://dusk2.geo.orst.edu/prosem/PDFs/lozano_Ecoregions.pdf

Suplee, M., R. Sada de Suplee, D. Feldman, and T. Laidlaw, 2005. Identification and Assessment of Montana Reference Streams: A Follow-up and Expansion of the 1992 Benchmark Biology Study. Helena, MT: Montana Department of Environmental Quality, 41 p. http://deq.mt.gov/wqinfo/standards/NumericNutrientCriteria.mcpx (shown as "Reference Study Report 2005" under Criteria Technical Reports - Wadeable Streams).

Suplee, M.W., A. Varghese, and J. Cleland, 2007. Developing Nutrient Criteria for Streams: An Evaluation of the Frequency Distribution Method. Journal of the American Water Resources Association 43: 453-472.

Suplee, M.W., V. Watson, A. Varghese, and J. Cleland, 2008. Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers. Helena, MT: Montana Department of Environmental Quality, 86 p. http://deq.mt.gov/wqinfo/standards/NumericNutrientCriteria.mcpx

Suplee, M.W., V. Watson, M. Teply, and H. McKee, 2009. How Green is too Green? Public Opinion of what Constitutes Undesirable Algae Levels in Streams. Journal of the American Water Resources Association 45: 123-140.

Suplee, M.W., and R. Sada de Suplee, 2011. Assessment Methodology for Determining Wadeable Stream Impairment Due to Excess Nitrogen and Phosphorus Levels. Helena, MT: Montana Department of Environmental Quality. Available at http://deq.mt.gov/wqinfo/qaprogram/sops.mcpx (click on "nutrient assessment method").

Suplee, M.W., and V. Watson, 2013. Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers—Update 1, *and addendums*. Helena, MT: Montana Dept. of Environmental Quality. http://deq.mt.gov/wqinfo/standards/NumericNutrientCriteria.mcpx

Suplee, M.W. and C. Schmidt, 2013. Derivation of Site-specific Numeric Nutrient Criteria for Selected Streams in the Upper Clark Fork Basin—*Addendum A to Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers-Update 1*. Helena, MT: Montana Dept. of Environmental Quality. http://deq.mt.gov/wqinfo/standards/NumericNutrientCriteria.mcpx